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COMPARATIVE RESISTANCE OF DIFFERENT COTTON GENOTYPES AGAINST INSECT PEST COMPLEX OF COTTON

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ABSTRACT

Six cotton strains, i.e. CRIS-168, CRIS-467, CRIS-468 CRIS-9, NIAB-78 and CIM-482 were tested for resistance against sucking (jassid *Amarasca devastance*, whitefly *Bemisia tabaci* and thrips *Thrips tabaci*) and bollworm complex (*Helicoverpa armigera* and *Earias* spp.) under unsprayed conditions at University College of Agriculture Bahauddin Zakariya University, Multan, Pakistan during 2004. CRIS-467 was highly susceptible to bollworms and jassid resulting in lowest seed cotton yield of 530.2 Kg/ha. Genotypes CRIS-168, CRIS-9, NIAB-78 and CIM-482 were moderate in degree of resistance against insect pest complex whereas CRIS-468 was highly resistant having maximum yield of 1021.0 Kg/ha.

INTRODUCTION

Cotton (*Gossypium hirstum* L.) is an important fiber and oilseed crop (Aslam *et al*. 2004). Cotton is considered as the backbone of Pakistan's economy (Mahmood, 1999). It is estimated that about 20-40% losses occur annually due to different pests of cotton (Aslam *et al*. 2004). Among the sucking insect pests, whitefly *Bemisia tabaci* (Genn.), jassid, *Amrasca devastance* (Dist.) and thrips, *Thrips tabaci* (Lind.) are considered as serious in Pakistan (Mohyuddin *et al*. 1997).

Plant resistance provides control of insect pests without any additional cost. It is economical and also safe for the environment (Pedigo, 1989, Khan and Sexena, 1998). Resistant varieties offer an inexpensive preventive measure, which is generally compatible with other methods of pest control (Chaudhry and Arshad, 1989). Variations of resistance levels among the different cotton varieties against sucking pests have been reported by earlier workers (Ali *et al*. 1999, Fairbanks *et al*. 2000 and Nath *et al*. 2000)

To cope with the problem, new varieties are introduced for possible resistance against sucking insect pests. Keeping in view the evaluation of new varieties for resistance against sucking insect pests and their yield loses, present studies were conducted to screen newly developed cotton varieties against sucking insect pests under local agro-climatic conditions of Multan.

MATERIALS AND METHODS

Six cotton strains including three promising strains viz. CRIS 168, CRIS 467, CRIS 468 and three standard strains viz. CRS 9, NIAB 78, CIM 482 were sown on June 8, 2003 at Research Farm of University College of Agriculture, Bahauddin Zakariya University, Multan, Pakistan in a Randomized Complete Block Design and replicated thrice. The net plot size was 30′x28′ for each treatment. Distance between rows and plants was 75cm and 23cm respectively. The recommended field practices were conducted.

Population of jassid (adults and nymphs), whitefly (adults) and thrips (adults and nymphs) per leaf was recorded early in morning at weekly intervals starting from June 28 to September 18, 2003. Fifteen leaves form each plot were selected from fifteen different randomly selected plants. These leaves were observed in such a sequence that first leaf from upper one third of the first plant, second leaf form middle one third of the second plant and third leaf from the lower one third of the third plant and so on.

Percent damage, i.e. combined infestation of *Earias* spp. and *Helicoverpa armigera* was recorded weekly starting form August 20 to October 25, 2003. For this purpose total immature fruiting parts (buds and flowers), mature fruiting parts (bolls) and damaged fruiting parts of all

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consecutive plants were counted within length of 134 cm per plot.

The trial was kept pesticide free throughout the growing season. Seed cotton yield of each treatment was converted to yield per hectarei.

The data were subjected to the analysis of variance (ANOVA) and means were separated by LSD test at P= 0.05, using MSTAT-C software (Michigan State Univ. 1982).

RESULTS AND DISCUSSION

Since the incidence of the pest is to be indirect reflection of the insect pests susceptibility or resistance, therefore, with an increase in per leaf pest population, the comparative resistance of the genotype is considered to decrease. (Aslam *et al.* 2004).

Fruiting Arts Amage

Based on mean seasonal percent damage of fruiting parts (buds, flowers and bolls) all cotton varieties showed significant difference among themselves (Table I). These results are similar to those of (Bughio *et al*. 1984; Mohan *et al*. 1996; Jackson *et al*. 2000) who reported significant variations among different cotton strains against spotted and American bollworms. The maximum percent damage (19.20%) of fruiting parts was recorded on CRIS-467 and the minimum percent damage (12.61%) was recorded on CRIS-468. Varieties NIAB-78, CIM-482 and CRIS-168 had non-significant difference but lower fruiting parts damage of 15.48%, 15.40% and 13.61%, respectively than that in CRIS-9 (16.61%). The mean seasonal percent fruiting parts damage in all the six varieties was above economic threshold level (ETL) i.e. 5-10% green boll damage (Ahmad, 2001).

Sucking Insect Arts

Below the economic threshold level pest population are of no significance. Effective pest resistant variety may therefore be described as reducing or maintaining pest population below damage threshold (Aslam *et al*. 2004).

Mean per leaf population of whitefly and jassid was significantly different on cotton genotypes but for thrips a non-significant difference was observed. The seasonal mean per leaf population of whitefly and thrips on all genotypes remain below ETL in contrast to the population of jassids, which was at or above ETL. Hence all the six genotypes showed varying degree of resistance against whitefly and thrips. Based on seasonal mean per leaf population of whitefly all the six varieties were statistically similar to each other. The maximum seasonal mean population (2.0^{-1} leaf) of thrips was recorded on CRIS-9 and the minimum population of 1.2^{-1} leaf was recorded on CRIS-168. Other four varieties CRIS-467, CRIS-468, NIAB-78 and CIM-482 were statistically at par having per leaf thrips population of 1.6, 1.7, 1.9 and 1.7, respectively.

All the six genotypes showed varying degree of susceptibility to jassid because they had a population at or above ETL. Genotype CRIS-467, CRIS-9, NIAB-78 and CIM-482 having 2.0, 1.7, 1.4 and 1.3 jassid^{-1} leaf, respectively were comparatively highly susceptible, whereas CRIS-168 with population of 0.9 and CRIS-468 with 0.61^{-1} leaf were comparatively least susceptible to the attack of jassid.

Table I ***Seasonal mean fruiting parts damaged (% age), mean seasonal/leaf population of sucking insect pests and average yield of different strains under unsprayed conditions.***

Cotton strain	Fruiting parts Damage (%)	Jassid^{-1} leaf	Thrips^{-1} leaf	Whitefly^{-1} leaf	Seed cotton yield (Kg^{-1} ha)
CRIS-168	13.61 bc	0.9 bc	1.2 b	0.5 a	959.1 b
CRIS-467	19.20 a	2.0 a	1.6 ab	1.0 a	530.2 f
CRIS-468	12.61 c	0.61 c	1.7 ab	0.8 a	1021.0 a
CRIS-9	16.32 ab	1.7 ab	2.0 a	0.7 a	825.5 c
NIAB-78	15.48 bc	1.4 abc	1.9 ab	0.8 a	676.2 e
CIM-482	15.40 bc	1.3 abc	1.7 ab	0.6 a	721.2 d

Seed Cotton Yield

The yield of all six strains of cotton was significantly different from each other. Maximum seed cotton yield was observed in CRIS-468 (1021.0 Kg^{-1} ha) followed by CIM- 482 (959.1 Kg^{-1} ha), CRIS- 9 (825.5 Kg^{-1} ha), CIM- 482 (721.2 Kg^{-1} ha), NIAB-78 (676.2 Kg^{-1} ha) and minimum on strain CRIS-467 (530.2 Kg^{-1} ha). These findings are in agreement with those of (Razaq *et al*. 2004).

CONCLUSION

Based on the maximum and minimum mean seasonal population of jassid and bollworms damage, it is concluded that CRIS-467 was highly susceptible where as CRIS-168, CRIS-9, NIAB-78 and CIM-482 were relatively resistant and CRIS-468 was resistant having maximum yield of 1021.0 Kg^{-1} ha.

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